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ABSTRACT

The Air Force Advanced Instructional System (AIS) is a prototype computer-based multimedia system for the administration and management of individualized technical training on a large scale. The paper provides an overview of the AIS: (1) its purposes and goals, (2) the background and rationale for the development approach, (3) a basic description of the total system, and (4) the developmental status and overall schedule. Practical considerations influencing the design approach for the AIS prototype included features of: cost-effectiveness, systems approach, incremental payoff, and maximum modularity and flexibility. Presently, AIS development is directed to the technically-related development activities of instructional materials development, instructional strategies, computer support, and system evaluation; future development will include system transition and institutional change. (Author/EA)

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The Air Force Advanced Instructional System (AIS): An Overview

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The Air Force Advanced Instructional System (AIS): An Overview

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INTRODUCTION

The purpose of this paper is to provide an overview of an effort to develop and demonstrate a large scale individualized training system within the Air Force environment to determine its feasibility in improving the efficiency of technical training. The specific program is the Advanced Instructional System or AIS which has been under development since May 1973 at Lowry Air Force Base, Colorado, under contract to McDonnell Douglas Corporation (MDC).

The AIS is a prototype computer-based multimedia system for the administration and management of individualized technical training on a large scale. The primary function of the AIS is to provide training and management for up to 2100 students per day in four selected courses currently being taught at the Lowry Technical Training Center. A secondary function of AIS is to serve as a test bed for the Air Force to evaluate the cost and training effectiveness of proposed instructional innovations prior to Air Force wide application.

The four courses chosen as the target AIS courses, were the Inventory Management (IM), Materiel Facilities (MF), Precision Measuring Equipment (PME), and Weapon Mechanic (WM) courses. They were selected because of

the differences in course lengths, training content, complexity, and the relatively high student flow.

BACKGROUND

During the 1970 - 1971 time period, a series of studies was initiated by AFHRL to provide a general design baseline and to explore certain critical areas prior to letting the total system development contract. The first study was an in-house survey conducted to assess the state-of-the-art in individualized and computer-based education and training. Field visits were made to a number of selected industrial, educational, and military facilities to determine the factors which led to successful and less successful implementations of individualized training. AFHRL also conducted a preliminary analysis of the Air Force training environment with particular emphasis on Lowry Air Force Base. This analysis and the field visits illuminated some major factors faced in conducting operational training on a large scale and led to several practical considerations which influenced the design approach.

First, to be judged successful, the system must be cost-effective. That is, it will have to demonstrate an acceptably high rate of return on investment.

Second, it became very clear that a systems approach not only to instructional design, but to overall system development was essential.

Third, the system is being developed in such a way as to provide incremental payoff.

Finally, AFHRL adopted the approach that the AIS prototype would have maximum modularity and flexibility to insure both ready modification and follow-on expansion.

In addition to the AFHRL in-house analyses during 1970 - 71, six contractual studies were initiated to explore various aspects of the AIS concept prior to letting a total system acquisition contract. These studies provided an improved design base in several key areas and increased confidence that the system could achieve its technical and cost-effectiveness goals.

FUNCTIONAL AND HARDWARE CHARACTERISTICS

Figure 1 depicts the AIS specification tree which is under contract. It is organized much like a weapon system with seven interrelated subsystems. Each of the subsystems is further broken down into a number of deliverable components.

Figure 2 shows in more concrete terms the various requirements which have been quantified in the contract. First, the MDC will deliver four individualized courses involving some 1530 total hours of instruction. These courses are to be capable of being conducted on a three shift operation for up to 2100 students per day. The critical quantitative requirement is that the average reduction in training across the four courses be at least 25% with no increase in student elimination and washback rates.

SCHEDULE STATUS

The overall AIS development schedule is shown in Figure 3. The system will be essentially functional at the end of the third year with the final year devoted to overall system test and documentation.

PROGRAM STATUS

Having almost reached the midpoint of the development phase, we are beginning to realize some of the incremental benefits of the program. With

the last five weeks of the 7 weeks IM/MF courses now self-paced, we have realized a time savings of over 35% representing over 55,000 hours of savings in student time. Because we have been developing and implementing the self-paced materials from back to front, we have been able to capitalize on these time savings by sending 800+ graduates out to the field approximately 7 days earlier than previously.

As you recognize, the 35%+ savings thus far achieved, is primarily due to the instructional design process in self-pacing the materials. The ultimate goal of AIS, of course, is to demonstrate that individualized instruction is feasible on a large scale. This implies the use of individual differences data with differential instructional approaches and strategies. The interim single track self-paced materials provide us with two things: (1) the incremental benefits already mentioned above, and (2) a baseline with which we can compare the effects of individualized instruction using computer support with the manually operated self-paced course. In addition to comparing the instructional aspects, we intend to assess the impact on the number of training personnel, logistics, administrative procedures and organizational structure.

We are now in the most critical stage in AIS development. The multitude of technical activities in instructional materials development, instructional strategies, computer support and the issues facing us in system evaluation are summarized in the four papers to follow. In addition to these technically related development activities, however,

are system transition and institutional change issues associated with the incremental implementation of AIS in the operational training environment. These issues have been of vital interest to us and are considered at least as important to the success of the program as the accomplishment of the technical tasks.

SYSTEM TRANSITION

The success of the prototype operational system will be measured not only by the performance of trainees, but the extent to which the AIS is operable and maintainable within the operational training organization. Thus, in our development, we have had to consider the impact of the instructional design approach (e.g., materials media, courseware, etc.) on the existing training structure. For example: Does the operational training organization have the necessary people to maintain selected equipment? Does the organization have the equipment and processes to produce courseware (i.e., filmstrips, 35mm slides, super 8mm video tape, audio tapes) in production quantities with adequate turn-around time? What are the reliability and maintainability characteristics of proposed AIS equipment? Can operational personnel take over revision and update tasks associated with the individualized approach? If the current organization and procedures are not structured to meet these requirements, what changes are necessary? The personnel and training subsystem and the related subsystem efforts have been devoted to answering these questions satisfactorily prior to system transition.

INSTITUTIONAL CHANGE

The other major issue which will undoubtedly determine the success of the program is the extent to which we are able to cope with institutional change. Here we refer to the impact of AIS on the organization at large and in particular the personnel. Instructors in the classroom are fulfilling a different role. Their previous role as primarily a lecturer is being changed to that of a course manager, tutor, and counselor. As those of you who have been involved in the conversion of conventional instruction to self-paced or individualized instruction know, the classroom instru tor is the crucial element and must be fully considered in the development and implementation process. A cadre of 24 ATC instructors are working with us full time in the development of instructional materials as well as in the initial introduction of the materials in training. Their involvement has been an absolute necessity. We still have the task of insuring acceptance by all of the instructors who will eventually be in the classroom using individualized materials. We recognize that without their support the AIS potential will not be fully realized. Much emphasis is now being placed on such issues as instructor selection, training, and the structuring of differential roles.

CONCLUSIONS

Although much has been accomplished, there still remains much to be done. In the next two years the system level integration and transitional phases will need to take place in order to meet the ultimate operational

goal of increasing instructional and cost effectiveness of Air Force technical training. We will then be in a position to exercise the secondary function of AIS as a research vehicle for further evaluation of proposed instructional innovations.

AIS SPECIFICATION TREE

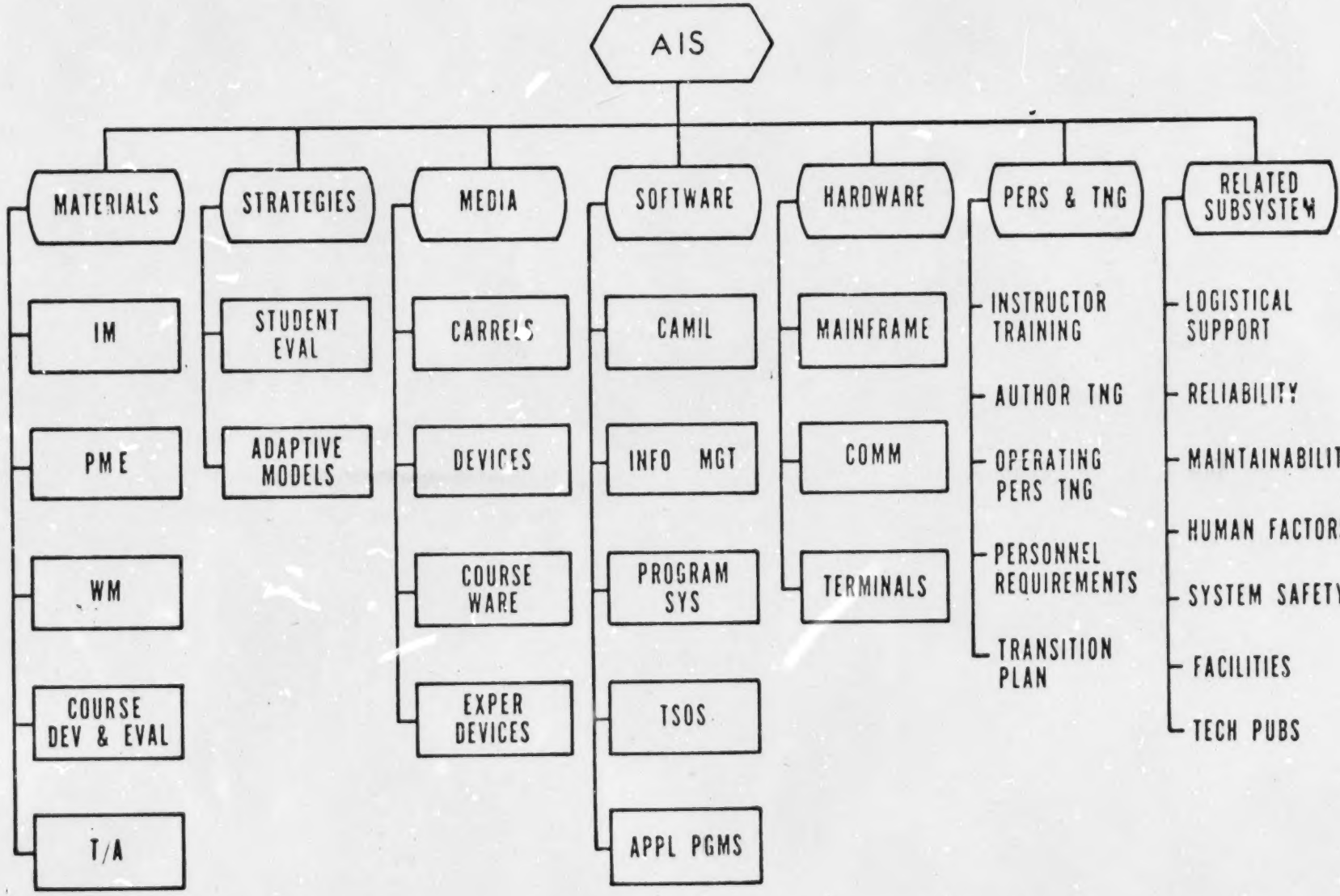

Fig. 1

AIS CHARACTERISTICS

CAPABILITIES	REQUIREMENTS
NO. OF COURSES	4
NO. OF STUDENTS	2100
TRAINING TIME REDUCTION	25%
ELIMINATION/WASHBACK RATES	NOT EXCEED
HARDWARE	
COMPUTER	(CDC CYBER 73-14)
INTERACTIVE TERMINALS	75
MANAGEMENT TERMINALS	16
STUDENT CARRELS	700
MEDIA DEVICES	500
MEDIA ALLOCATION	
PRINTED MATERIALS	55%
AUDIO/VISUAL PRESENTATION	35%
CAI	10%

Fig. 2

AIS DEVELOPMENT SCHEDULE

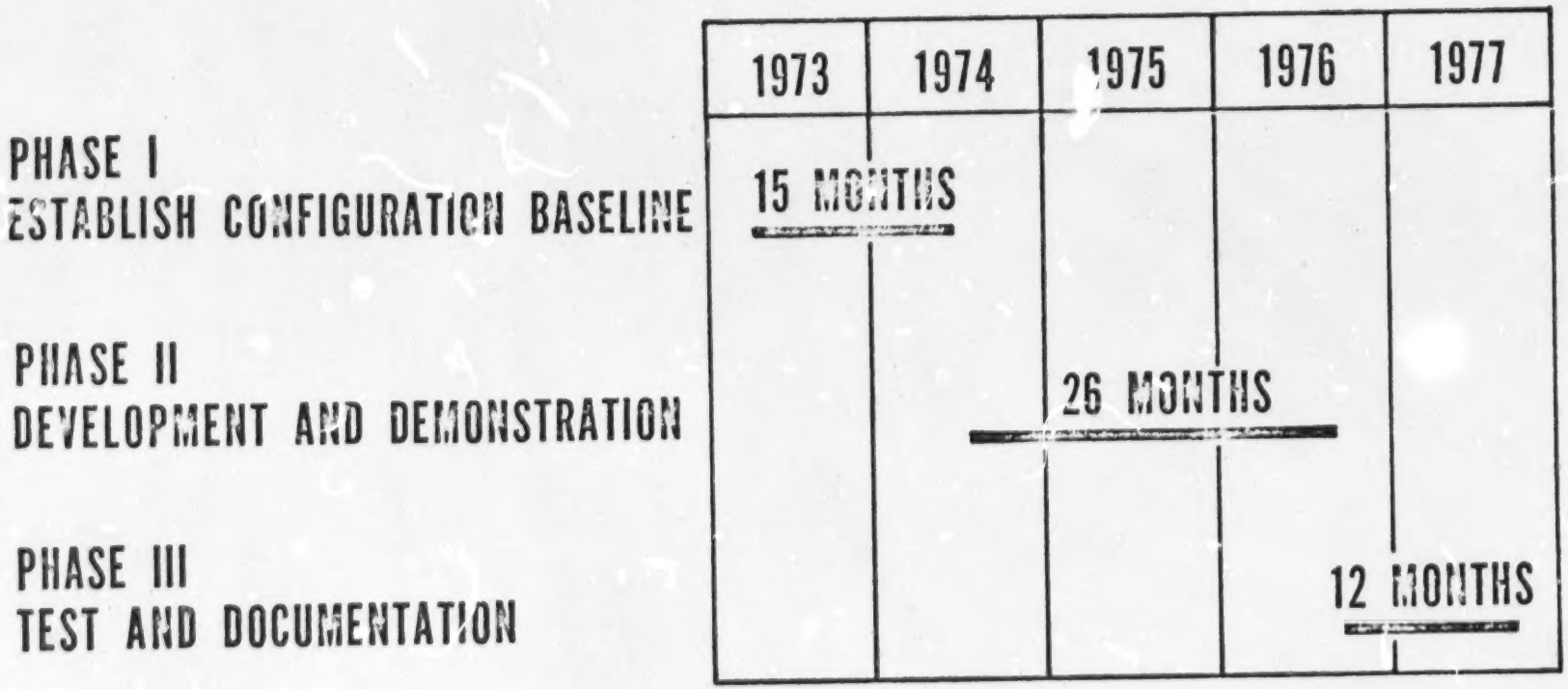

Fig. 3